Comparing the RLS tradeoffs at EUV, e-beam and 193 nm for common resist platforms

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Understanding and addressing the resolution, line width roughness (LWR) and phorospeed (RLS) performance limitations intrinsic to chemically amplified photoresists is a topic of significant interest in the semiconductor community[1]. While much of the current research is devoted to the study of EUV resists due to their stringent photospeed requirements, RLS considerations are common to all high performance chemically amplified resists including 193 immersion resists, e- beam resists and resists for maskless lithography.

In this contribution, we describe experiments comparing the measured linewidths, LWR and photospeed for the same resists imaged at 193i, EUV and 100 keV e-beam. One set of exposure tools is based on a 300 mm platform and includes an ASML 1700i, ASML EUV Alpha demo tool and a Vistec VB300. Alternative data sets are taken on a 193 nm IL exposure system, Leica VB6 and the SEMATECH Berkeley MET EUV exposure tool. Results from both commercial and experimental resists will be presented. These experiments are designed to provide insight into the wavelength-dependent performance of modern resists, and will provide guidelines for the design of optimized resist chemistries for specific wavelengths.

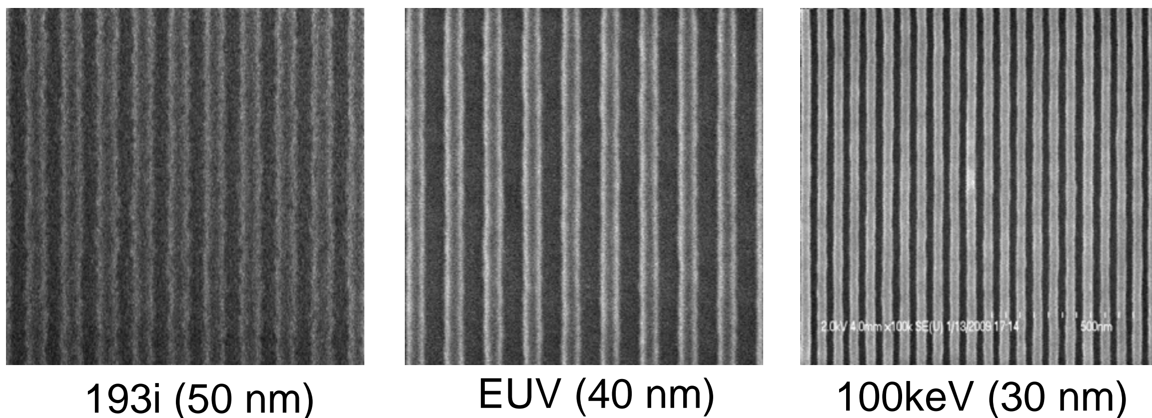

Figure 1 SEM results for the same resist exposed at 193 nm, EUV and e-beam

References

1. van Steenwinckle et al. Proceedings of SPIE Vol 6519 6519ov-11